Nursing-Constructed Central Venous Catheter Program: A Six-Step Guide to Implementation

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ABSTRACT: **Nurses have successfully inserted Ultrasound-guided Peripherally Inserted Central Catheters (PICCs) at the bedside for many years. In the face of economic challenges in health care, bedside PICC nurses have expanded their skills to offer safe, effective, and financially viable options to provide bedside vascular access. We describe how the PICC team has successfully integrated ultrasound- and electrocardiogram-guided central venous catheter insertions via the internal jugular vein into a nurse-led vascular access program and have outlined a six-step approach to construction and implementation of a similar process. (J Radiol Nurs 2016;35:19-23.)**

KEYWORDS: **Central venous access; Radiology nurse; Ultrasound.**

The United States is in the midst of health care transformation, and nurses can play a fundamental role in the foundation ("Front Matter." Institute of Medicine, 2011). One step to assist in this transformation is the establishment of nurse-led central venous catheter (CVC) programs in hospitals. When nurses develop expertise in this area, it can improve the efficiency of physicians, be a cost savings to hospitals, and most importantly expedite care for patients. Although the development of this program may encounter challenges, with proper planning and implementation, the goal of a nurse-led CVC program can be successfully realized. Existing ultrasound-based peripherally inserted central catheter (PICC) nurses are in an ideal position to lead this initiative.

BACKGROUND

Interest in initiating a nurse-leg PICC program originated and developed as the author was working as a nurse in the interventional radiology (IR) lab 8 years ago. The hospital is a 180-bed general acute-care medical center located in Baltimore, Maryland. Momentum for developing an advanced vascular access program grew as a result of dissatisfaction with a slow 2-day response to requests for central venous access and with the increased cost which resulted from the insertion of PICCs by a radiologist using fluoroscopy in the IR laboratory. The process began at the Maryland State Board of Nursing. The Maryland State Nurse Practice Act does not limit nursing in this practice area; thus, the inception of the PICC program was started.

In the fall of 2008, the author (T.Y.) successfully enlisted an interventional radiologist to be a mentor and assist with educating the radiology-based nurses to insert PICCs. On completion of a PICC insertion course, didactic simulation and practical education with the interventional radiologist, I quickly transitioned into a dedicated PICC nurse team of one, inserting PICCs at the bedside. I worked closely with our education department and used manufacturer provided clinical educators to gain initial competency and have since built a structured competency requirement to ensure safe, effective, and duplicable practice. A program which used didactic instruction, simulation education, and clinical hands-on training to facilitate learning was created. After the initial program completion of one registered nurse (RN), a structured competency requirement was established to ensure safe practice.

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In the first year, the PICC insertion totals more than doubled from <200 annually to >450, whereas the turnaround time was measured in hours rather than days. The program now employs two full-time RNs and one part-time RN, and the hours of operation are from 7:00 a.m. to 7:00 p.m. Monday through Friday.

In the ever-changing climate of health care and the projected shortage of physicians in the next several years, enhancements including a shift in vascular access responsibilities will be necessary. The Association of American Medical College's Center for Workforce Studies estimates that by 2020; the United States will face a shortage of 45,000 primary care physicians and 46,100 surgeons and medical specialists (Gallegos, 2014). These estimates take into account an aging physician workforce, the 15 million patients who will become eligible for Medicare and the 32 million younger patients who will become newly insured through the Affordable Care Act (Gallegos, 2014). Proactive development of a nurse-led vascular access program including PICCs and CVCs may help mitigate the concerns of a physician shortage and an aging population.

DEVELOPMENT OF AN EVOLVING VASCULAR ACCESS PROGRAM

Initially, outside the IR laboratory, bedside PICC insertions required a chest X-ray for tip confirmation before releasing the line for use. The adoption of technologies, including real-time directional catheter tracking and electrocardiogram (ECG) tip location systems quickly resulted in a decrease of malpositioned catheters to almost zero percent. This technology allows a clinician to confirm catheter tip location in the lower third of the superior vena cava at or near the cavoatrial junction using an ECG feedback system during insertion when the patient has an identifiable and consistent P wave. Now, in lieu of a chest X-ray after PICC insertion, the nurse is able to confirm placement at the time of insertion and release the line for immediate use. Nursing quickly realized the benefits of this bedside program when the catheter was available for immediate use, allowing patients to receive necessary treatments without delay and in turn, reduce their length of stay (LOS). Although electrocardiogram (EKG) technology has limitations and becoming proficient takes time, the benefits of the system far outweighed the learning curve. Implementation of the EKG tip location and tracking system eliminated approximately 600 chest X-rays at this facility in the first year of use thereby reducing radiation exposure to patients and staff. Another benefit was the reduction of >1000 hr of therapy delay when PICCs were immediately available using the EKG system rather than awaiting chest X-ray and radiologist interpretation.

The PICC insertion program was very successful, but a large population of patients who were not candidates for PICC insertion remained inaccessible because of impaired renal function or active hemodialysis. Traditionally, these patients were referred to a surgical house officer (hospital-employed surgeon) or interventional radiologist for central venous access. Realizing the benefits of the PICC program, the staff began investigating an initiative to add insertion of centrally placed CVCs to the responsibilities of the vascular access nurse. This process once again began at the Maryland State Board of Nursing. In a letter from the Maryland State Board to the President of the local chapter of the Infusion Nurse Society, it was confirmed that it was now within the scope of practice for properly trained RNs to use the internal jugular (IJ) vein, among other sites, as an alternate site for insertion of a centrally placed venous catheter (A. Williams, personal communication, October 17, 2011).

IMPLEMENTATION OF A NURSE-LED CENTRAL VENOUS CATHETER PROGRAM

Over the course of a year, a nurse-led CVC program was approved, and education was completed. The process of establishing a CVC program is one that takes determination, time, and perseverance. The following are vital steps in developing and implementing a nurse-led CVC program.

Step 1: Investigation

It is imperative to review the state's Nurse Practice Act to confirm that the insertion of centrally placed central catheters by nurses is not expressly prohibited. If there is no specific mention of this practice or the exact scope is unclear, the Board of Nursing should be consulted. Begin by determining the type of decision model the state Board of Nursing follows, a decision tree or an advisory council. The decision tree model allows an RN to pose a specific practice through a series of questions to determine whether that practice falls under that state's scope of practice for nurses. Because there are so many specific practices for nurses and technologies are changing rapidly, no person or small group can remain current as experts in all fields, so the decision tree model exists to provide consistency in decision-making. An advisory council is a body or group that may be contacted or petitioned by nurses to receive a formal opinion as to whether a practice is legal or advised (Royer & Earhart, 2007).